

January 1999



Mathematics 30

Grade 12 Diploma Examination

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January 1999

Mathematics 30

Grade 12 Diploma Examination

Description

Time: 2.5 h. This examination was developed to be completed in 2.5 h; however, you may take an additional 0.5 h to complete the examination.

This is a **closed-book** examination consisting of

- 40 multiple-choice and 9 numerical-response questions, of equal value, worth 70% of the examination
- 3 written-response questions, of equal value, worth 30% of the examination

A tear-out formula sheet and a z -score page are included in this booklet.

All graphs on this examination are computer-generated.

Note: *The perforated pages at the back of this booklet may be torn out and used for your rough work.*

No marks will be given for work done on the tear-out pages.

Instructions

- You are expected to provide your own scientific calculator.
- Use only an HB pencil for the machine-scored answer sheet.
- Fill in the information required on the answer sheet and the examination booklet as directed by the presiding examiner.
- Read each question carefully.
- Consider all numbers used in the questions to be **exact** numbers and not the result of a measurement.
- If you wish to change an answer, erase **all** traces of your first answer.
- Do not fold the answer sheet.
- The presiding examiner will collect your answer sheet and examination booklet and send them to Alberta Education.
- Now turn this page and read the detailed instructions for answering machine-scored and written-response questions.

Multiple Choice

- Decide which of the choices **best** completes the statement or answers the question.
- Locate that question number on the separate answer sheet provided and fill in the circle that corresponds to your choice.

Example

This examination is for the subject of

- A. biology
- B. physics
- C. chemistry
- D. mathematics

Answer Sheet

(A) (B) (C)

Numerical Response

- Record your answer on the answer sheet provided by writing it in the boxes and then filling in the corresponding circles.
- If an answer is a value between 0 and 1 (e.g., 0.7), then be sure to record the 0 before the decimal place.
- Enter the first digit of your answer in the left-hand box and leave any unused boxes blank.**

Examples

Calculation Question and Solution

Correct to the nearest tenth of a radian, 40° is equal to _____ rad.

$$\begin{aligned}40^\circ &= 0.6981317008 \dots \text{ rad} \\&= 0.7\end{aligned}$$

(Record your answer in the numerical-response section on the answer sheet.)

Record 0.7 on the
answer sheet

→

0	.	7	
---	---	---	--

0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

Written Response

Correct-Order Question and Solution

When the following subjects are arranged in alphabetical order, the order is _____. .

- 1 biology
- 2 physics
- 3 chemistry
- 4 mathematics

(Record **all four digits** of your answer in the numerical-response section on the answer sheet.)

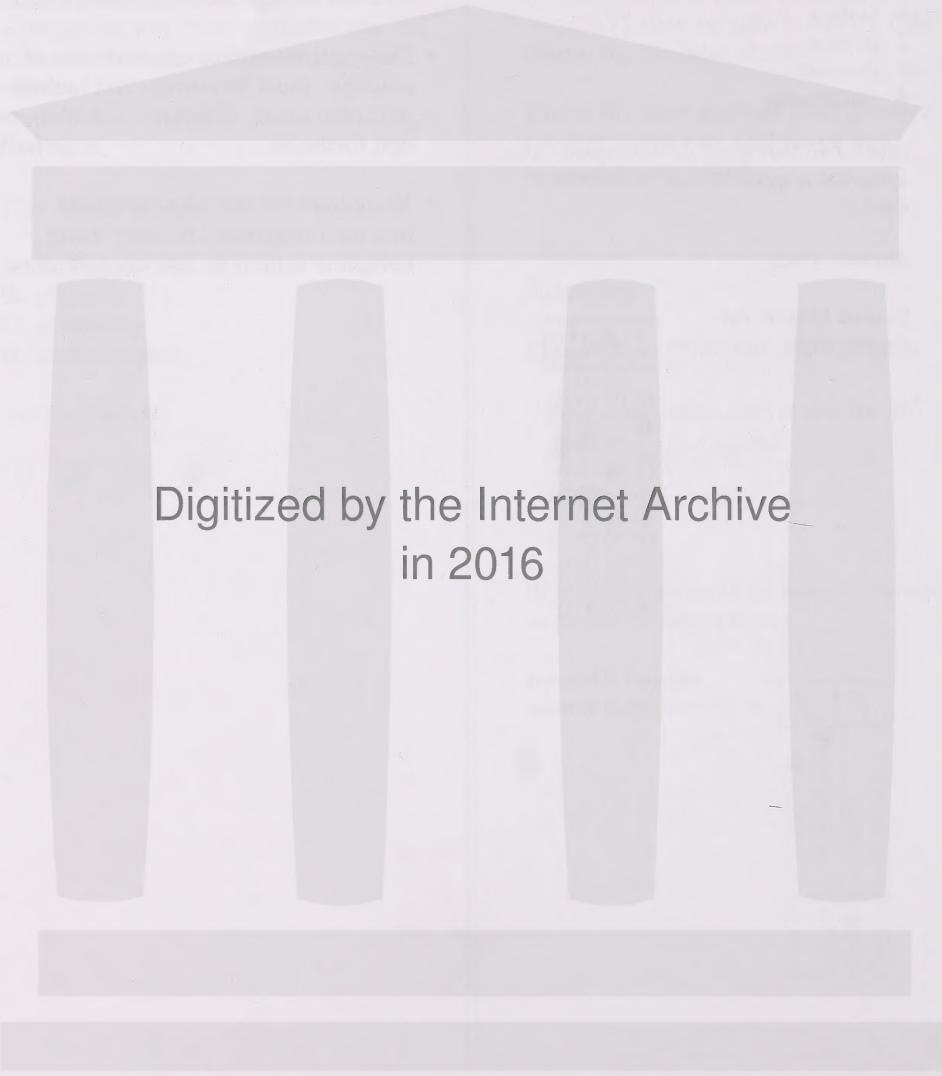
Answer: 1342

Record 1342 on the
answer sheet →

1 3 4 2



- Write your answers in the examination booklet as neatly as possible.
- For full marks, your answers must address **all** aspects of the question.
- Descriptions and/or explanations of concepts must be correct and include pertinent ideas, diagrams, calculations, and formulas.
- Your answers must be presented in a well-organized manner using complete sentences and correct units.



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Use the following information to answer the first question.

Four Functions

$$\text{I } P(x) = 3x^{-3} + 2x^{-2} + x^{-1} + 6$$

$$\text{II } Q(x) = 3x^3 + 2x^2 + x + 6$$

$$\text{III } S(x) = \sqrt{3}x^3 + \sqrt{2}x^2 + x + 6$$

$$\text{IV } T(x) = \sqrt{3}x^{\frac{3}{2}} + \sqrt{2}x^{\frac{1}{2}} + x + 6$$

1. Of the four functions given above, those that are polynomial functions are numbered

A. I and II
B. II and III
C. II and IV
D. III and IV

2. The y -intercept of the graph of the function defined by $P(x) = a(x - r_1)(x - r_2)(x - r_3)$ is

A. $r_1 + r_2 + r_3$
B. $(r_1)(r_2)(r_3)$
C. $-a(r_1)(r_2)(r_3)$
D. $-a(r_1 + r_2 + r_3)$

3. The zeros of a cubic polynomial function P are 1 , $\sqrt{5}$, and $-\sqrt{5}$. If $P(x) = x^3 + bx^2 + cx + d$, then $P(2)$ is equal to

A. -3
B. -1
C. 1
D. 3

4. If $P(x) = x^3 - 7x - 3$ is divided by $(x + 1)$, then $P(x)$ may be written as

A. $(x^2 - 8)(x + 1) + 5$
B. $(x^2 - x - 6)(x + 1) + 3$
C. $(x^3 - 7x - 3)(x + 1) + 3$
D. $(x^3 - 7x - 3)(x + 1) + 5$

5. The zeros of two cubic polynomial functions, P and Q , are the same. The numerical coefficients of x^3 are 6 and -3 , respectively. If $P(1) = 10$, then $Q(1)$ is

A. equal to -20
B. equal to -5
C. equal to 7
D. impossible to determine

6. If $3x$ is a factor of the polynomial $P(x)$, then one x -intercept of the graph of P must be

A. 3
B. $\frac{1}{3}$
C. 0
D. -3

7. If $G(x) = 8x^4 + 3x^2 - x + k$, then the value of k that will make -1 a zero of G is

A. -12
B. -10
C. 10
D. 12

Numerical Response

1. The graph of $y = k(x - 2)^2(x - 4)$ has a y -intercept of -96 . The value of k , correct to the nearest tenth, is _____.

(Record your answer in the numerical-response section on the answer sheet.)

8. If $\theta = \frac{\pi}{6}$ radians and $\cos \theta - k = 0$, then the value of k is

A. -0.17

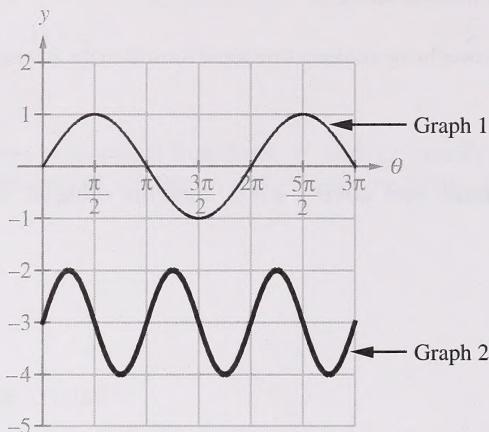
B. 1.02

C. $\frac{1}{2}$

D. $\frac{\sqrt{3}}{2}$

Use the following information to answer the next question.

The partial graphs of two sinusoidal functions are shown below on the same grid.

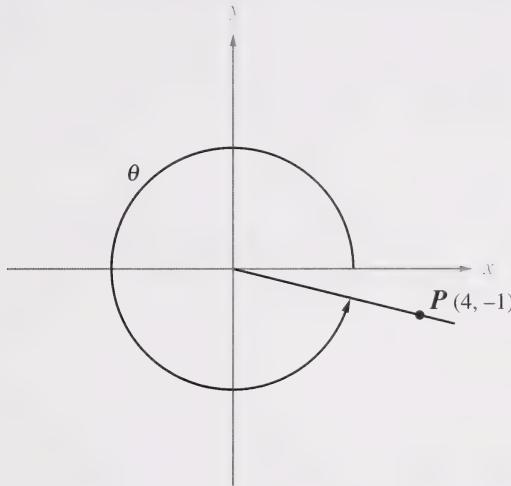


9. The equation of graph 1 is $y = a \sin b(\theta + c) + d$ for some integers a , b , c , and d . Graph 2 is obtained by changing exactly two parameters in the equation of graph 1. The two parameters that are changed are

- A. a and c
- B. a and d
- C. b and c
- D. b and d

Use the following information to answer the next question.

The point $P(4, -1)$ is on the terminal arm of an angle in standard position, as shown below.



10. The measure of angle θ , correct to the nearest tenth of a radian, is

- A. 0.2 rad
- B. 3.4 rad
- C. 5.8 rad
- D. 6.0 rad

11. The expression $\sin(x + y) + \sin(x - y)$ is equal to

- A. $2 \sin x \sin y$
- B. $2 \sin x \cos y$
- C. $2 \cos x \sin y$
- D. $2 \cos x \cos y$

12. The horizontal line $y = 2$ intersects the graph of $y = 2 \sin^2 \theta + 3 \sin \theta$ at two points in the interval $0 \leq \theta \leq \pi$. The θ values of the points of intersection can be found by solving

- A. $2 \sin^2 \theta + 3 \sin \theta = 2$
- B. $2 \sin^2 \theta + 3 \sin \theta = -2$
- C. $2 \sin^2 \theta + 3 \sin \theta = 0$
- D. $2 \sin^2 \theta = 0$ and $3 \sin \theta = 0$

13. If $1 + \sin \theta = 2 \cos^2 \theta$, $0 \leq \theta \leq 2\pi$, then θ is equal to

- A. $\frac{\pi}{6}, \frac{\pi}{2}, \frac{7\pi}{6}$
- B. $\frac{\pi}{6}, \frac{5\pi}{6}, \frac{3\pi}{2}$
- C. $\frac{\pi}{2}, \frac{2\pi}{3}, \frac{4\pi}{3}$
- D. $\frac{5\pi}{6}, \frac{7\pi}{6}, \frac{3\pi}{2}$

Numerical Response

2. The length of the arc subtended by a central angle of $\frac{\pi}{6}$ radians on a circle of radius 12 cm, correct to the nearest hundredth of a centimetre, is _____ cm.

(Record your answer in the numerical-response section on the answer sheet.)

Numerical Response

3. If $(5 \sin \theta + 4)(\sin \theta - 2) = 0$, $180^\circ < \theta < 270^\circ$, then the value of θ , correct to the nearest degree, is _____°.

(Record your answer in the numerical-response section on the answer sheet.)

14. If $\log_x \frac{125}{27} = -\frac{3}{2}$, then the value of x is

A. $\frac{9}{25}$

B. $\frac{25}{9}$

C. $-\frac{9}{25}$

D. $-\frac{25}{9}$

Use the following information to answer the next question.

In a nuclear disaster at Chernobyl in April 1986, approximately 12 600 kg of radioactive iodine-131 was released into the atmosphere. The half-life of iodine-131 is 8.04 days; therefore, after 8.04 days, half of the iodine-131 had decayed. The amount, $N(t)$, of iodine-131, in kilograms, remaining after t days is given by

$$N(t) = 12\,600 \left(\frac{1}{2}\right)^{\frac{t}{8.04}}$$

15. The approximate mass of iodine-131 remaining after 30 days was

- A. 70 kg
- B. 131 kg
- C. 420 kg
- D. 949 kg

16. The expression $2 \log_a 5 + \log_a 6 - \frac{1}{3} \log_a 8$, $a > 0$, equals

- A. $\log_a 29$
- B. $\log_a 30$
- C. $\log_a 75$
- D. $\frac{8}{3} \log_a 3$

17. A logarithmic form of $81^{\frac{3}{4}} = 27$ is

A. $\log_{27}\left(\frac{3}{4}\right) = 81$

B. $\log_{\frac{3}{4}}(27) = 81$

C. $\log_{27}(81) = \frac{3}{4}$

D. $\log_{81}(27) = \frac{3}{4}$

18. If $\log_2(x) + 8 = 0$, then the value of x is

A. -3

B. $-\frac{1}{256}$

C. $\frac{1}{256}$

D. 3

19. The value of $\sum_{n=1}^9 \log\left(\frac{n}{n+1}\right)$ is equal to

A. -1

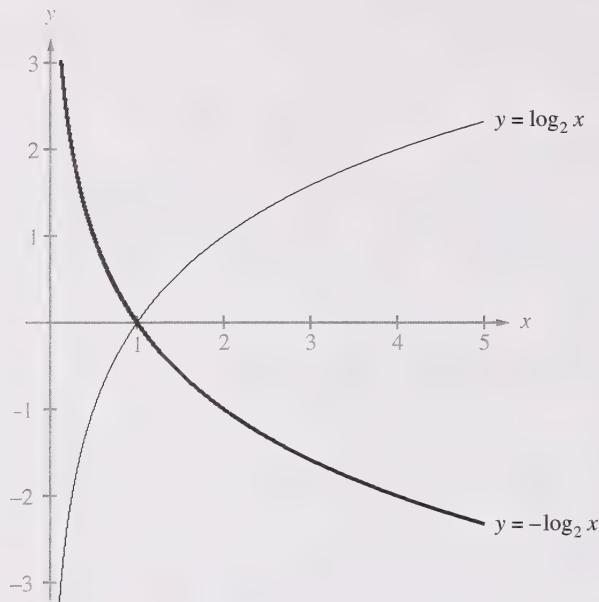
B. $\log\left(\frac{45}{54}\right)$

C. $\log\left(\frac{35\,638}{5\,040}\right)$

D. $-1 + \log 9$

Use the following information to answer the next question.

A student uses a computer program to plot the partial graph of $y = \log_2 x$. The student then reflects this graph in the x -axis, as shown below.



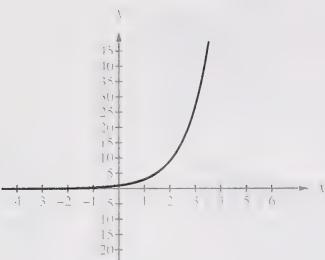
20. The student realizes the equation of the new graph can be $y = -\log_2 x$ or

- A. $y = \log_2(-x)$
- B. $2^y = x$
- C. $y = -2^x$
- D. $y = \log_2\left(\frac{1}{x}\right)$

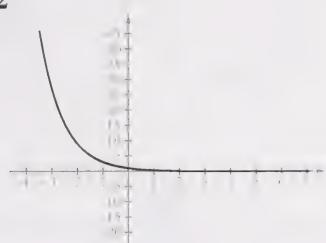
Use the following information to answer the next question.

Graphs of Four Functions

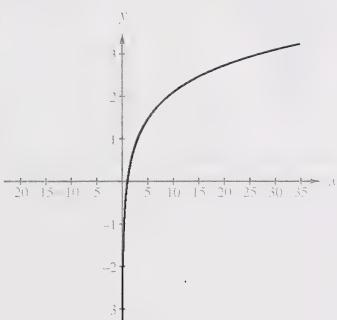
1



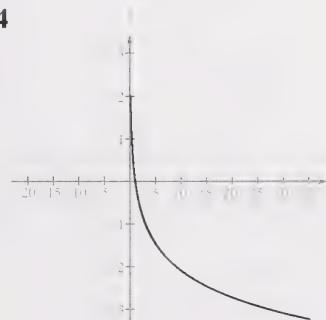
2



3



4



Numerical Response

4. Match each of the graphs, as numbered above, to the statement below that describes it.

This graph represents an exponential function with a base between 0 and 1.

_____ (Record in the first column.)

This graph represents an exponential function with a base greater than 1.

_____ (Record in the second column.)

This graph represents a logarithmic function with a base between 0 and 1.

_____ (Record in the third column.)

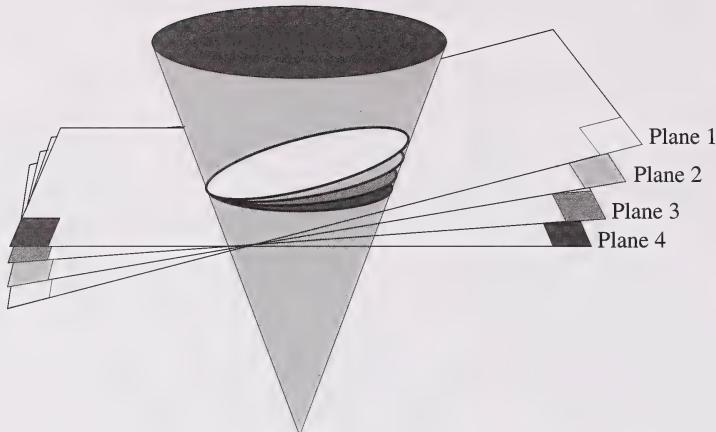
This graph represents a logarithmic function with a base greater than 1.

_____ (Record in the fourth column.)

(Record your answer in the numerical-response section on the answer sheet.)

Use the following information to answer the next question.

Four ellipses are formed by cutting a cone with four planes, as shown below.



21. The ellipse with the greatest eccentricity lies in

- A. plane 1
- B. plane 2
- C. plane 3
- D. plane 4

Use the following information to answer the next question.

The following four equations, when graphed, are four different conics.

I $y^2 + 12x - 60 = 0$

II $x^2 + y^2 - 25 = 0$

III $25x^2 + 9y^2 - 225 = 0$

IV $16x^2 - 25y^2 - 400 = 0$

22. The equation above that satisfies the locus definition that states that the sum of the distances from any point P on the curve to two distinct fixed points is always constant is equation

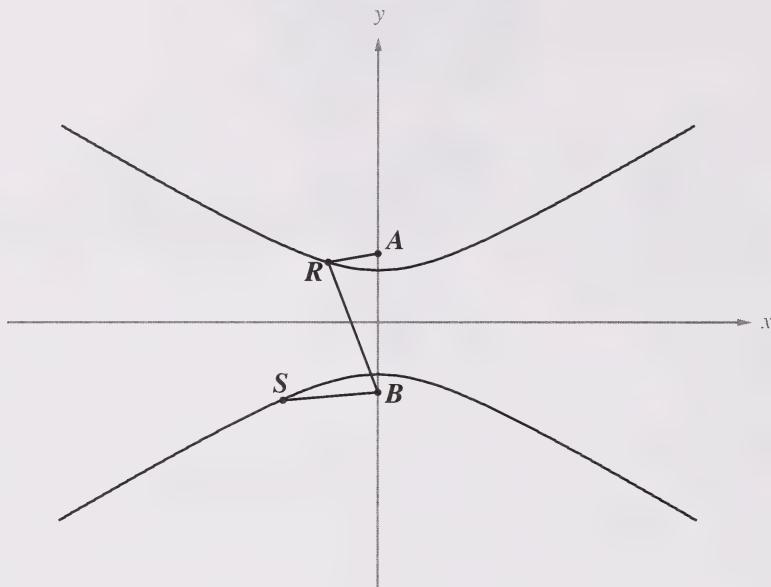
- A. I
- B. II
- C. III
- D. IV

23. Alex is asked to draw a graph of a conic that has an eccentricity of $\frac{5}{4}$. The graph should be of

- A. a circle
- B. an ellipse
- C. a parabola
- D. a hyperbola

Use the following information to answer the next question.

Points A and B are the foci of a hyperbola centred at the origin. Points R and S are on opposite branches of the hyperbola, as shown below.

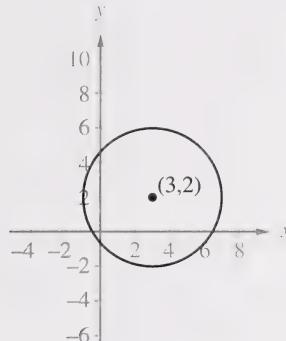


24. If $\overline{RB} = 12$, $\overline{RA} = 4$, and $\overline{SB} = m$, then \overline{SA} is equal to

- A. $8 + m$
- B. $8 - m$
- C. $16 + m$
- D. $16 - m$

Use the following information to answer the next question.

A circle is graphed on a computer, as shown below.

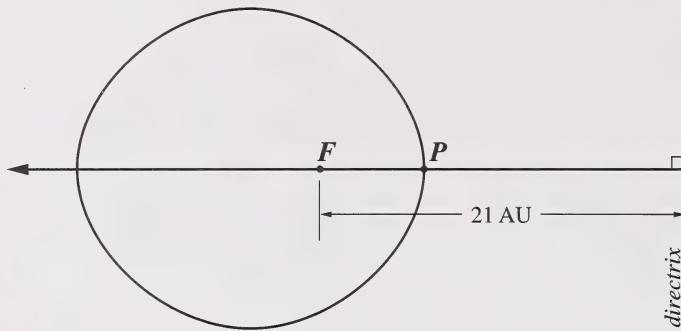


25. If the circle's equation is $x^2 + y^2 + Dx + Ey + F = 0$, then

- A. $D < 0$ and $E < 0$
- B. $D > 0$ and $E < 0$
- C. $D > 0$ and $E > 0$
- D. $D < 0$ and $E > 0$

Use the following information to answer the next question.

The eccentricity of a comet that orbits around the Sun is 0.40. A diagram of the orbit is shown below. The Sun is at one focus, which is labelled F .



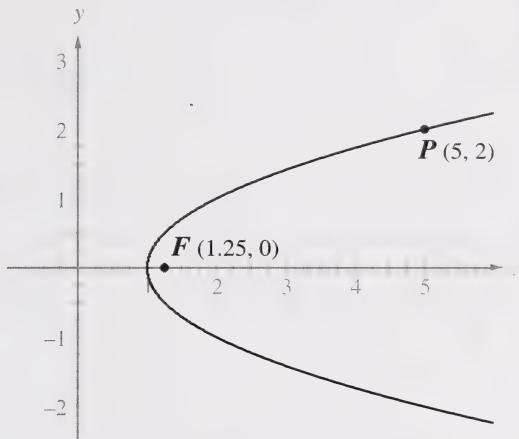
AU = astronomical units

26. If the distance from the Sun to the directrix is 21 AU, then the distance from the Sun to the comet at point P is

- A. 4 AU
- B. 6 AU
- C. 10 AU
- D. 15 AU

Use the following information to answer the next question.

The graph of $y^2 - x + 1 = 0$ is shown below. The focus of the parabola is $F(1.25, 0)$.



Numerical Response

5. The distance from point $P(5, 2)$ to the directrix, correct to the nearest hundredth, is _____.

(Record your answer in the numerical-response section on the answer sheet.)

27. The sum of the first 5 terms in an arithmetic sequence is -40 .
If $t_9 = 16$, then the common difference is

- A. 2
- B. 4
- C. 8
- D. 14

28. A company called Ihopi Ltd. pays its stockholders quarterly in January, April, July, and October of each year. Ihopi Ltd. paid its stockholders $\$0.23$ per share in January 1998. The company will increase the payment $\$0.04$ per quarter for each share until the payment in October 1999. If a stockholder receives all payments for 1998 and 1999, then the total amount he receives per share from Ihopi Ltd. will be

- A. $\$0.51$
- B. $\$2.12$
- C. $\$2.96$
- D. $\$3.51$

29. The value of $\sum_{n=1}^{25} (-5n + 6)$ is equal to

- A. $-1\,475$
- B. -930
- C. -124
- D. -119

Use the following information to answer the next question.

The cost of renting a medium sized car is \$32.00 per day plus 12¢ per kilometre for any distance travelled beyond 100 km per day. After the first 100 km, the company's charges are based on 50 km increments. A chart illustrating the cost of driving the car is shown below.

Number of kilometres/day	100	150	200	250		800
Cost (\$)	32.00	t_2	t_3	t_4		t_n

30. If \$32.00 is the first term in the sequence, then the sequence $32.00, t_2, \dots, t_n$ can be described as

- A. an arithmetic sequence with a common difference of 6
- B. an arithmetic sequence with a common difference of 50
- C. a geometric sequence with a common ratio of 6
- D. a geometric sequence with a common ratio of 0.12

Use the following information to answer the next question.

A marathon runner is in the final preparation for a race. On each successive day, she increases her water intake by 200 mL and trains $\frac{9}{10}$ of the time she did the previous day, as shown below.

Day	Water Intake (mL)	Training Time (h)
1	600	2
2	800	1.8
3	1 000	1.62
4	1 200	1.458

31. On the day she takes in 2 000 mL of water, her training time, correct to the nearest hundredth of an hour, will be

- A. 1.16 h
- B. 1.06 h
- C. 0.96 h
- D. 0.86 h

32. A sequence is defined recursively as

$$t_1 = -4$$

$$t_n = -\frac{1}{2}(t_{n-1}), \quad n \geq 2$$

A general term that defines the same sequence explicitly for $n \in N$ is

A. $t_n = 2^{n-1}$

B. $t_n = (-2)^{n-1}$

C. $t_n = -4(2^{-n+1})$

D. $t_n = -4\left(-\frac{1}{2}\right)^{n-1}$

Use the following information to answer the next question.

A certain pile driver pounds a steel column into the ground. On the first drive, the column is pounded 1.8 m into the ground, and on each successive drive it moves 92% as far as it did on its previous drive.

Numerical Response

6. The **total distance** that the column moves in 60 drives, correct to the nearest tenth of a metre, is _____ m.

(Record your answer in the numerical-response section on the answer sheet.)

33. The number of different arrangements of all the letters in the word **TOOTH** is

A. $5!$

B. $\frac{5!}{2!}$

C. $\frac{5!}{2!2!}$

D. $\frac{5!}{3!2!}$

34. Four books, labelled W, X, Y, and Z, are placed randomly on a shelf. The probability that they are placed in alphabetical order, from left to right, is

A. $\frac{1}{4}$

B. $\frac{1}{6}$

C. $\frac{1}{24}$

D. $\frac{1}{256}$

35. As a reward for signing up a new member for a music club, Alan will receive 10 different CDs from a list of 50 CDs. Alan already owns some of the 50 CDs on the list. What is the probability that a random selection of 10 different CDs from the list will include 4 CDs that Alan already owns?

A. $\frac{4C_4 \times 46C_6}{50C_{10}}$

B. $\frac{4C_4 \times 46C_{10}}{50C_{10}}$

C. $\frac{46P_6}{50P_{10}}$

D. $\frac{46P_{10}}{50P_{10}}$

36. The names of 15 students are put into a hat. Of these, 4 students are going to be chosen for a school trip to Saskatoon. The number of different possible groups of students is

A. 4!

B. 15!

C. 1 365

D. 32 760

Use the following information to answer the next question.

The manager of a sports store wants 5 different tents to be illustrated on one page of a sales flyer. The illustrations will be positioned one above the other.

Dome tent



Scout tent



Rain tent



Hiking tent



Spacious tent



37. In the flyer, the Dome, Rain, and Spacious tents are blue, the Scout tent is beige, and the Hiking tent is yellow. The blue tents can appear in any order; however, the manager does not want to have one blue tent immediately after another blue tent. If this is the only restriction, then how many different positions are possible?

- A. 2
- B. 12
- C. 20
- D. 60

Numerical Response

7. In the expansion of $(a + b)^{10}$, the numerical coefficient of a^7b^3 is _____.

(Record your answer in the numerical-response section on the answer sheet.)

Numerical Response

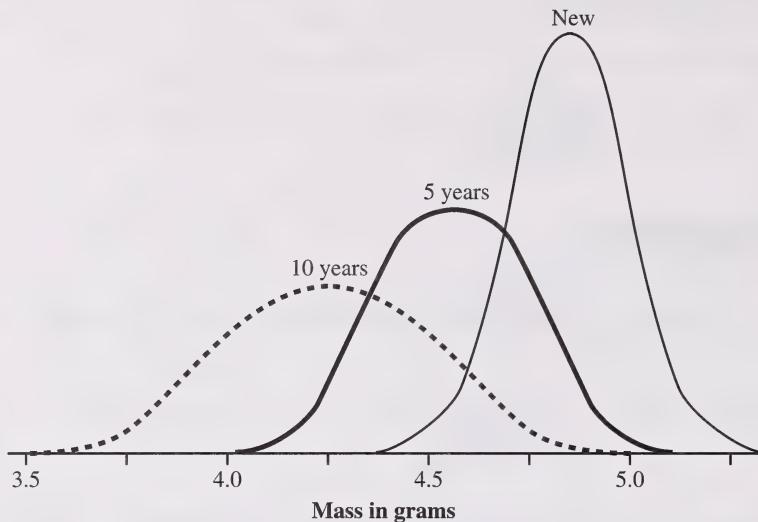
8. The number of 3-digit numbers **less than 400** that can be formed if the last digit is either 4 or 5 is _____.

(Record your answer in the numerical-response section on the answer sheet.)

38. Test scores for an examination are normally distributed with a mean of 67.4% and a standard deviation of 10.5%. The probability that a particular student gets less than 80% on the examination is

- A. 0.1151
- B. 0.3849
- C. 0.5120
- D. 0.8849

Use the following information to answer the next question.



The curves in this graph show the variations in the mass of some dimes that were minted and put into circulation at the same time. One curve shows the distribution of the mass of the dimes, when the dimes were new, and the other two curves show the distributions of the mass of the dimes when they had been in circulation for five years and for ten years.

39. According to this graph, as time passes, the standard deviation of the mass of the dimes

- A. decreases
- B. increases
- C. remains the same
- D. cannot be approximated from the graph

40. The results of a test were normally distributed with a standard deviation of 16.5. Jim's raw score was 2.5 times the mean, and his corresponding z -score was 2.8. The mean of this test, correct to the nearest tenth, was

A. 30.8
B. 41.6
C. 48.2
D. 56.4

Numerical Response

9. The marks on a final examination in Biology 20 are normally distributed. Susan scored 68%, which is equivalent to a z -score of 1.25. If the standard deviation of the Biology 20 final examination marks is 4%, then the mean, correct to the nearest tenth of a percentage, is _____%.

(Record your answer in the numerical-response section on the answer sheet.)

The written-response questions follow on the next page.

Use the following information to answer the next question.

The table below shows the number of new phone numbers assigned and the total number of phone numbers in use in a small Alberta community, over a six-year period.

Year	Number of New Phone Numbers Assigned	Total Number of Phone Numbers In Use	Growth Rate
1989	—	2261	—
1990	172	2433	7.6%
1991	136	2569	
1992	172	2741	
1993	154	2895	
1994	155	3050	
1995	111	3161	

Written Response—10%

1. Complete the chart above by determining the annual growth rates, correct to the nearest tenth of a percentage.

- Assume that the mean growth rate is 6%. Using this growth rate, determine an exponential function, $P(t)$, that approximates the total number of phone numbers in use where t is the number of years after 1989.

- All the telephone numbers in this community belong to the 598-exchange. This means that they all begin with the digits 598 followed by any 4 digits. What is the total possible number of telephone numbers beginning with the digits 598? What assumptions did you make to obtain your answer?
- Use the mean growth rate of 6% to predict the year in which a new exchange will be required for this community.

(Written-response question 2 begins on the next page.)

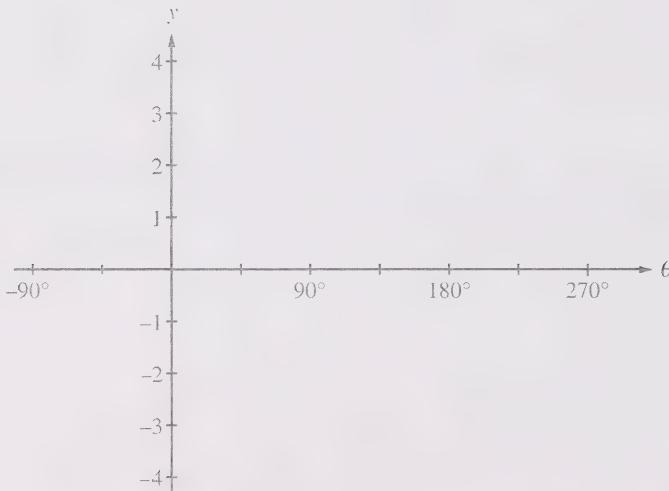
Use the following information to answer the next question.

The graph of the function $f(x) = a \sin b(x + c) + d$, $-90^\circ \leq x \leq 270^\circ$, satisfies the following conditions.

- The minimum value occurs at the point $Q(0^\circ, -2)$.
- The maximum value occurs at the point $R(180^\circ, 4)$.
- The only points of intersection of $y = f(x)$ with the line $y = 1$ occur at $x = -90^\circ$, $x = 90^\circ$, and $x = 270^\circ$.

Written Response—10%

2. • On the grid below, demonstrate your understanding of the conditions and then sketch $y = f(x)$, $-90^\circ \leq x \leq 270^\circ$.

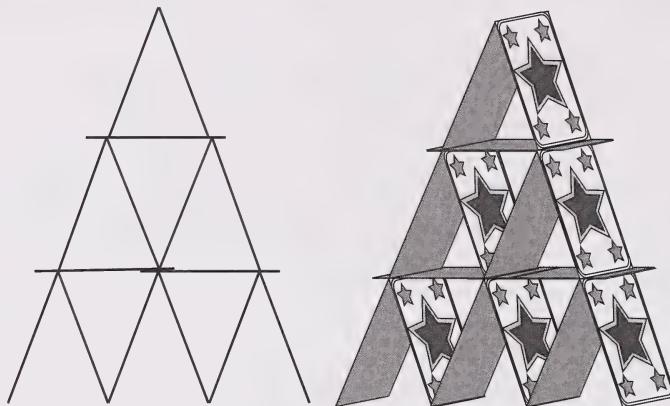


- Determine an equation for $f(x) = a \sin b(x + c) + d$ that satisfies the given conditions.
- Algebraically determine the value(s) of the x -intercept(s), $-90^\circ \leq x \leq 270^\circ$, correct to the nearest degree. Explain whether or not your sketch supports your answer.

(Written-response question 3 begins on the next page.)

Use the following information to answer the next question.

Two views of a “house of cards” are shown below.



Written Response—10%

3. • How many cards were used to build this house?

• The “card house” shown is 3 storeys high. If a similar “card house” 6 storeys high was built, then how many cards would be required?

- Determine an expression that could be used to calculate the number of cards required to build a similar “card house” k storeys high.
- If there are 52 cards in a deck of cards, then what is the minimum number of **decks** of cards required to build a similar “card house” so that no cards are left over?

*You have now completed the examination.
If you have time, you may wish to check your answers.*

Mathematics 30 Formula Sheet

The following information may be useful in writing this examination.

- The roots of the quadratic equation $ax^2 + bx + c = 0$ are

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

- The distance between two points (x_1, y_1) and (x_2, y_2) is

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Quadratic Relations

- $e = \frac{|PF|}{|PD|}$

Trigonometry

- arc length $a = r\theta$
- $\sin^2 A + \cos^2 A = 1$
- $1 + \tan^2 A = \sec^2 A$
- $1 + \cot^2 A = \csc^2 A$
- $\sin(A + B) = \sin A \cos B + \cos A \sin B$
- $\sin(A - B) = \sin A \cos B - \cos A \sin B$
- $\csc A = \frac{1}{\sin A}$
- $\sec A = \frac{1}{\cos A}$
- $\cot A = \frac{\cos A}{\sin A}$
- $\cos(A + B) = \cos A \cos B - \sin A \sin B$
- $\cos(A - B) = \cos A \cos B + \sin A \sin B$

Fold and tear along perforation.

Permutations and Combinations

- ${}_nP_r = \frac{n!}{(n-r)!}$
- ${}_nC_r = \frac{n!}{r!(n-r)!}$
- In the expansion of $(x + y)^n$, the general term is $t_{k+1} = {}_nC_k x^{n-k} y^k$

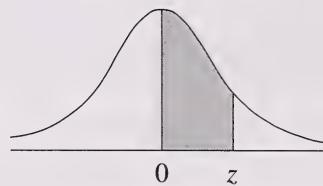
Sequences and Series

- $t_n = a + (n-1)d$
- $S_n = \frac{n[2a + (n-1)d]}{2}$
- $S_n = n \left(\frac{a + t_n}{2} \right)$
- $t_n = ar^{n-1}$
- $S_n = \frac{a(r^n - 1)}{r - 1}, r \neq 1$
- $S_n = \frac{rt_n - a}{r - 1}, r \neq 1$

Exponential and Logarithmic Functions

- $\log_a mn = \log_a m + \log_a n$
- $\log_a \frac{m}{n} = \log_a m - \log_a n$
- $\log_a m^n = n \log_a m$

$$z = \frac{x - \mu}{\sigma}$$



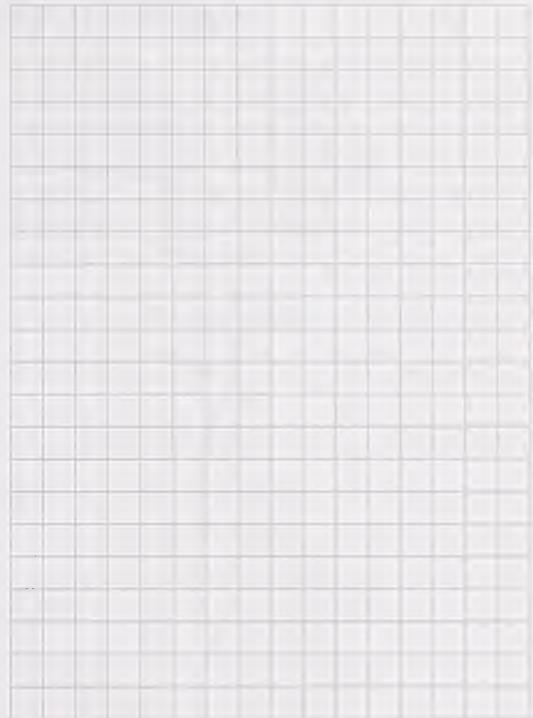
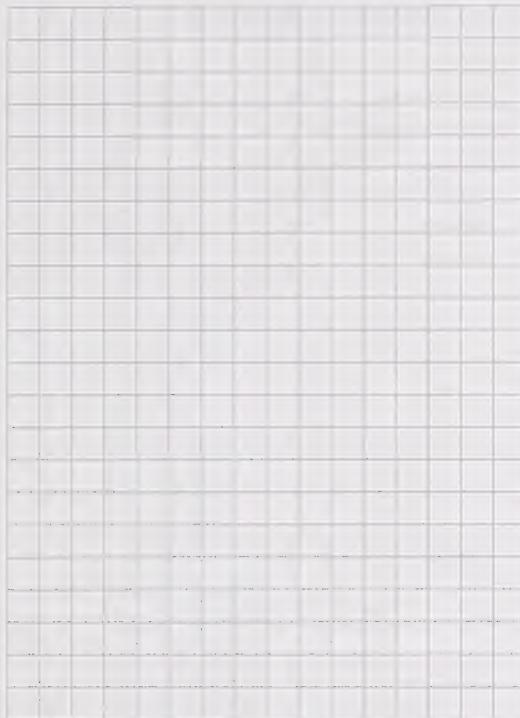
Areas under the Standard Normal Curve

<i>z</i>	0	1	2	3	4	5	6	7	8	9
0.0	0.0000	0.0040	0.0080	0.0120	0.0160	0.0199	0.0239	0.0279	0.0319	0.0359
0.1	0.0398	0.0438	0.0478	0.0517	0.0557	0.0596	0.0636	0.0675	0.0714	0.0754
0.2	0.0793	0.0832	0.0871	0.0910	0.0948	0.0987	0.1026	0.1064	0.1103	0.1141
0.3	0.1179	0.1217	0.1255	0.1293	0.1331	0.1368	0.1406	0.1443	0.1480	0.1517
0.4	0.1554	0.1591	0.1628	0.1664	0.1700	0.1736	0.1772	0.1808	0.1844	0.1879
0.5	0.1915	0.1950	0.1985	0.2019	0.2054	0.2088	0.2123	0.2157	0.2190	0.2224
0.6	0.2258	0.2291	0.2324	0.2357	0.2389	0.2422	0.2454	0.2486	0.2518	0.2549
0.7	0.2580	0.2612	0.2642	0.2673	0.2704	0.2734	0.2764	0.2794	0.2823	0.2852
0.8	0.2881	0.2910	0.2939	0.2967	0.2996	0.3023	0.3051	0.3078	0.3106	0.3133
0.9	0.3159	0.3186	0.3212	0.3238	0.3264	0.3289	0.3315	0.3340	0.3365	0.3389
1.0	0.3413	0.3438	0.3461	0.3485	0.3508	0.3531	0.3554	0.3577	0.3599	0.3621
1.1	0.3643	0.3665	0.3686	0.3708	0.3729	0.3749	0.3770	0.3790	0.3810	0.3830
1.2	0.3849	0.3869	0.3888	0.3907	0.3925	0.3944	0.3962	0.3980	0.3997	0.4015
1.3	0.4032	0.4049	0.4066	0.4082	0.4099	0.4115	0.4131	0.4147	0.4162	0.4177
1.4	0.4192	0.4207	0.4222	0.4236	0.4251	0.4265	0.4279	0.4292	0.4306	0.4319
1.5	0.4332	0.4345	0.4357	0.4370	0.4382	0.4394	0.4406	0.4418	0.4429	0.4441
1.6	0.4452	0.4463	0.4474	0.4484	0.4495	0.4505	0.4515	0.4525	0.4535	0.4545
1.7	0.4554	0.4564	0.4573	0.4582	0.4591	0.4599	0.4608	0.4616	0.4625	0.4633
1.8	0.4641	0.4649	0.4656	0.4664	0.4671	0.4678	0.4686	0.4693	0.4699	0.4706
1.9	0.4713	0.4719	0.4726	0.4732	0.4738	0.4744	0.4750	0.4756	0.4761	0.4767
2.0	0.4772	0.4778	0.4783	0.4788	0.4793	0.4798	0.4803	0.4808	0.4812	0.4817
2.1	0.4821	0.4826	0.4830	0.4834	0.4838	0.4842	0.4846	0.4850	0.4854	0.4857
2.2	0.4861	0.4864	0.4868	0.4871	0.4875	0.4878	0.4881	0.4884	0.4887	0.4890
2.3	0.4893	0.4896	0.4898	0.4901	0.4904	0.4906	0.4909	0.4911	0.4913	0.4916
2.4	0.4918	0.4920	0.4922	0.4925	0.4927	0.4929	0.4931	0.4932	0.4934	0.4936
2.5	0.4938	0.4940	0.4941	0.4943	0.4945	0.4946	0.4948	0.4949	0.4951	0.4952
2.6	0.4953	0.4955	0.4956	0.4957	0.4959	0.4960	0.4961	0.4962	0.4963	0.4964
2.7	0.4965	0.4966	0.4967	0.4968	0.4969	0.4970	0.4971	0.4972	0.4973	0.4974
2.8	0.4974	0.4975	0.4976	0.4977	0.4977	0.4978	0.4979	0.4979	0.4980	0.4981
2.9	0.4981	0.4982	0.4982	0.4983	0.4984	0.4984	0.4985	0.4985	0.4986	0.4986
3.0	0.4987	0.4987	0.4987	0.4988	0.4988	0.4989	0.4989	0.4989	0.4990	0.4990
3.1	0.4990	0.4991	0.4991	0.4991	0.4992	0.4992	0.4992	0.4992	0.4993	0.4993
3.2	0.4993	0.4993	0.4994	0.4994	0.4994	0.4994	0.4994	0.4995	0.4995	0.4995
3.3	0.4995	0.4995	0.4995	0.4996	0.4996	0.4996	0.4996	0.4996	0.4996	0.4997
3.4	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4998
3.5	0.4998	0.4998	0.4998	0.4998	0.4998	0.4998	0.4998	0.4998	0.4998	0.4998
3.6	0.4998	0.4998	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999
3.7	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999
3.8	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999
3.9	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000

Fold and tear along perforation.

No marks will be given for work done on this page.

Fold and tear along perforation.



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